COSC 341 – Tutorial 1

1. Let $A = \{0, 1, b, f, \text{SpongeBob}\}$ and $B = \{1, \text{Patrick}, \text{SpongeBob}, 2, f, m\}$ be two sets. List the elements of:
   (a) $A \cup B$ (the union of X and B)
   (b) $A \cap B$ (the intersection of A and B)
   (c) $A \setminus B$ (the complement of B relative to A)
   (d) $B \setminus A$ (the complement of A relative to B)
2. Set builder notation
   (a) Give the set $\{0, 2, 4, 6, 8, \dots\}$ in set builder notation
   (b) List the elements of $\{x | x \leq 5, x \in \mathbb{N}\}$
3. Let $A = \{\text{Connor}, \text{Tauiri}, \text{Hans-Christian}\}$ and $B = \{\text{SpongeBob}, \text{Patrick}\}$ be two sets.
   (a) List all elements of $\mathcal{P}(A)$ (the power set of A)
   (b) List all the members of $A \times B$
   (c) List all functions from B to A
4. Are the following functions $f : \mathbb{N} \to \mathbb{N}$ surjective, injective, bijective?
   (a) $f(x) = 2x + 1$
   (b) $f(x) = \frac{x}{2}$ (integer division, e.g. $\frac{3}{2} = 1$)
   (c) $f(x) = 1$ (constant)
5. Give examples of functions $f : \mathbb{N} \to \mathbb{N}$ that are bijective.